

REMARKS

By the present amendment, claims 1 and 2 have been amended to obviate the examiner's objections thereto and/or to further clarify the concepts of the present invention. Specifically, claims 1 and 2 have been amended to state that the recited particle size is an average particle size. Entry of the above amendments is respectfully requested.

In the Office Action, claim 1 was rejected under the first paragraph of 35 USC § 112 as containing subject matter which was not described in the specification as filed. Specifically, it was asserted that the claim limitation that some of the Si particles have a size greater than $10\mu\text{m}$ is not supported in the subject specification. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

It is submitted that the claims are in conformance with the provisions of the cited statute. More particularly, it is submitted that the recitation as to the particle size of Si being greater than $10\mu\text{m}$ is supported by, among others, Fig. 1 of the drawings as filed. The Si particles of shown Fig. 1 can be analyzed by an image processor and the measured size of the Si particles can be converted to a circle having the same area as the measured Si particles. From these measurements, an average size of the particles can be obtained.

Accompanying this Amendment is a magnified copy of Fig. 1 of the drawings where the scale of the photomicrograph shown is 25 μm . An apparently average-sized particle is shown on this copy and the particle is copied besides a scale of 10 μm . It is clear that Fig. 1 provides a support of the claimed size of the Si particles.

For the reasons stated above, withdrawal of the rejection under the first paragraph of 35 U.S.C. § 112 is respectfully requested.

Claims 1-4 were rejected under 35 USC § 103(a) as being unpatentable over the patent to Mori et al in view of the patent to Kawagoe et al. In making this rejection, it basically was asserted that the cited Mori et al patent teaches Al-Si or Al-Si-Sn compositions with ranges for the disclosed components which overlap those as claimed in independent claims 1 and 2. With regard to the claim limitation of the ratio of the short diameter to the long diameter, Figure 1 of the Mori et al patent was alleged to show this feature. With regard to the claim limitation of the particle size greater than 10 μm , it was asserted that the comparative example teaches such particles and further that the Mori et al patent teaches that these particles are undesirable in the specifically disclosed materials. From the latter, it was presumed that such materials actually had been made.

Further, it was acknowledged that the Mori et al patent does not teach the use of (a) HVOF flame spraying of applying the alloy and (b) surface roughening of the substrate by shot blasting. As to the former (a), it was alleged that the HVOF is a well known form

of thermal spraying as taught by the Mori et al patent. As to the latter (b), the cited patent to Kawagoe et al was asserted to provide this teaching deficiency. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

It is submitted that the cited Mori et al patent does not teach or suggest the subject matter as is now set forth in amended claims 1 and 2 and the claims dependent thereon. Among other things, it is submitted that an important difference between the subject matter as set forth in independent claims 1 and 2 and the cited Mori et al patent is that the compositions according to the invention have an average particle size greater than $10 \mu\text{m}$ and such is not suggested in the patent.

In the Action, reference was made to column 4, lines 20-22 of the Mori et al patent as teaching particles greater than $10 \mu\text{m}$ in a comparative example outside the disclosed invention. It is submitted that the fact that the comparative example of the Mori et al patent teaches such particles is irrelevant as the composition of the comparative examples is not being applied in alleging that the claimed subject matter is unpatentable. As to the second assertion that the Mori et al patent teaches that particles of this size are undesirable in the specifically disclosed materials would seem to weigh in the favor of the patentability of the subject claims since the cited patent teaches away from the claimed concept.

In addition, it is submitted that the presumption of the examiner that such materials

actually had been made by the inventors of the Mori et al patent is speculation. The mere statement in a patent that a certain structure is undesirable does not mean that such a structure has been made. In fact, the Si particles greater than 10 μm is coarser than the Si particles shown in Fig. 1(A) of the Mori et al patent by approximately a hundred times. It would be usually impossible to produce Si particles having extremely great size, as long as the flame-spraying method is identical, i.e., the plasma spraying coating method.

It must be emphasized that the inclusion of relatively coarse Si particles of more than 10 μm as shown in Fig. 1 of the present application contributes to enhance both wear resistance and seizure resistance with the materials according to the present invention. In contrast, the Si particles are fine (less than 10 μm) in the Mori et al patent and only contribute to enhance the wear resistance.

It is further submitted that another important difference between the subject matter as set forth in independent claims 1 and 2 and the cited patent is that the composition according to the invention is "flame-sprayed by means of high velocity oxy-fuel flame-spraying method (HVOF) onto a substrate roughened by shot blasting" as opposed to being thermally sprayed as taught by the Mori et al patent. The HVOF method produces a special morphology of the Si particles as is set forth on page 5, line 32 of the subject specification. The shape of Si particles shown in Fig. 1 of the present invention is neither globular nor needle-like, but rather is irregularly shaped.

More particularly, Fig. 1(B) of the Mori et al patent shows a cast Al-Si alloy in which Si particles with nodular or plate-like morphology and fine intermetallic Si compounds with needle-like morphology are dispersed, these expressions of morphology being based on text book terminology. The Si particles of a HVOF flame-sprayed alloy are more round than the Si particles of a cast Al-Si alloy. Although two distinct morphologies are found in Fig. 1(B) of the Mori et al patent, only one morphology is found in Fig. 1 of the present invention. As can be understood from the above explanation, the use of HVOF is not only a process feature, but also is a feature which differentiates the morphology of Si particles from the cast alloy.

Therefore, the microstructure of the compositions of the present invention which is formed by HVOF is different from that formed by plasma spraying. Among other things, the number of particles in unit area in the case of HVOF is considerably smaller than that formed by plasma spraying as illustrated in the second attached drawing. In this regard, it is to be noted that the morphology of Si particles according to the present invention does not belong to any known morphology and hence is difficult to exactly define by words. Consequently, the best manner is by defining this structure as a process feature.

A position taken in the Action relative to the products according to the Mori et al patent was that the burden of showing that the products according to the invention patentably distinguish over the products according to the patent is placed upon applicants. In order to overcome this position, applicants submit that the products according to the

claimed invention differ from those of the patent in terms of structure and thus one or more properties and these differences produce unexpected or surprising results. Among others, the flame-sprayed aluminum alloy has adhesive strength of film higher than that of a flame-sprayed Ni film, as measured by a shear-fracture testing method.

In view of the above, it is submitted that the alloys according to the claimed invention differ from those of the cited Mori et al patent in terms of one or more of proportions, structure and/or properties and these differences produce unexpected or surprising results.

It is submitted that the above noted teaching deficiencies of the Mori et al patent are not supplied by the Kawagoe et al patent. Specifically, it is submitted that one of ordinary skill in the art would not employ the surface roughening as taught by the secondary Kawagoe et al patent in the product as disclosed in the primary patent to Mori et al. Therefore, one of ordinary skill in the art would not be led to select or turn to the teachings of the secondary patent.

As is well settled, obviousness under Section 103 of the statute requires a teaching or suggestion in the art to combine the teachings of the patents as proposed by the examiner with the expectation that the results achieved would have been predicted by that person of ordinary skill. The patents provide no suggestion to motivate one of ordinary skill in the art to combine their teachings in the manner proposed by the examiner. It is an

established principle of U.S. patent practice that the prior art must contain some suggestion for combination since without such, any combination is pure speculation on the part of the examiner and is based on a prohibited hindsight reconstruction from applicants' own disclosure.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103 and allowance of claims 1 through 4 as amended over the cited patents are respectfully requested.

Claim 6 was rejected under 35 USC § 103(a) as being unpatentable over the same patent to Mori et al in view of the patent to Kawagoe et al further in view of the patent to Wilkoz et al. In making this rejection, it was acknowledged that the combination of the Mori et al and Kawagoe et al patents does not teach a layer covering the outer surface of the wear resistant coating. The additionally cited Wilkoz et al patent was then asserted to provide this deficiency. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

It is submitted that essentially the same considerations as were set forth above with respect to the first prior art rejection would also apply equally as well to this rejection of the dependent claim 6. Accordingly, withdrawal of the rejection under 35 U.S.C. § 103 and allowance of claim 6 over the cited patents are respectfully requested.

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In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

DWH:rab
Enclosure: Drawings (2)

Marked Up Version of Amendments to Specification and Claims

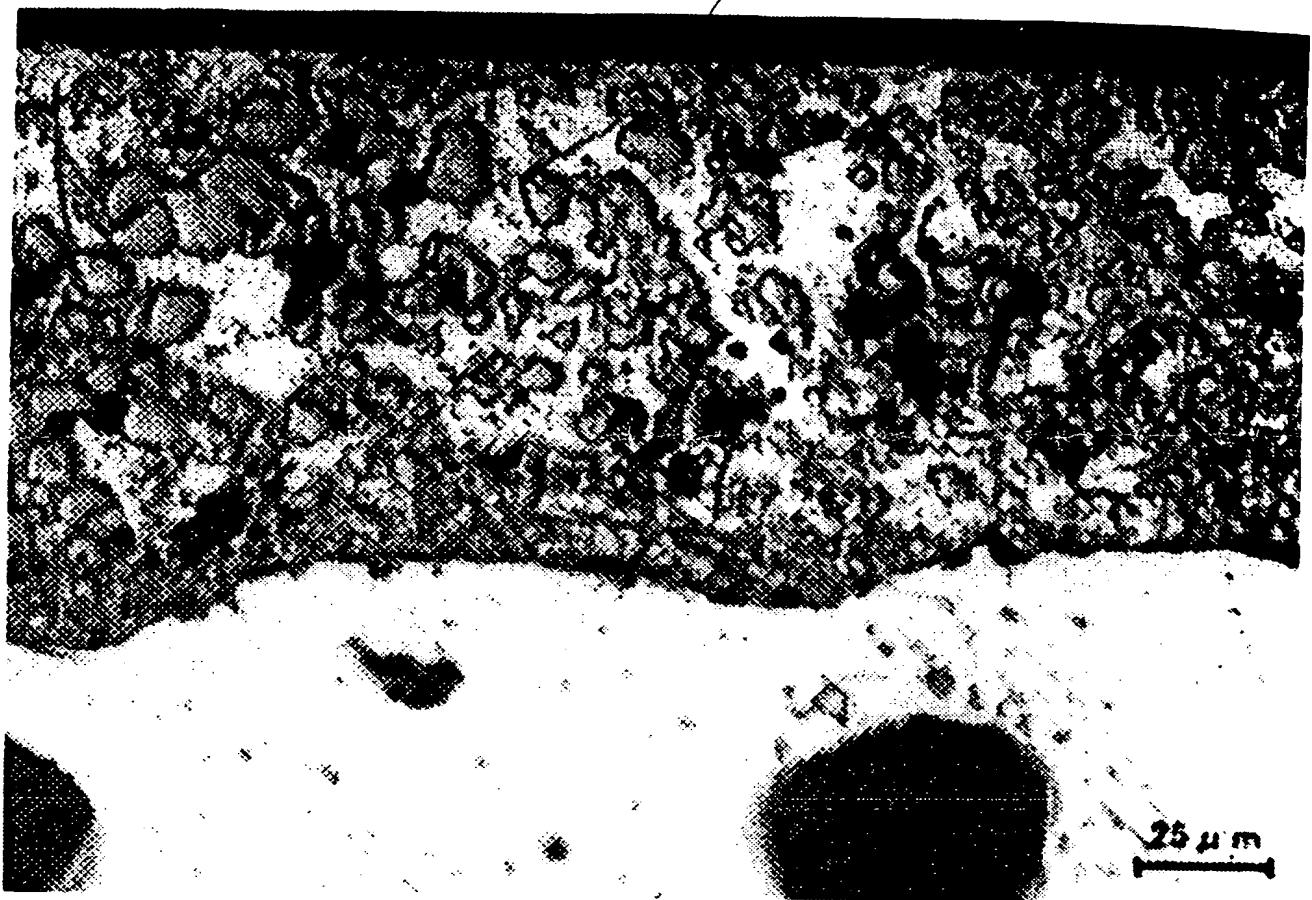
IN THE CLAIMS:

1. (Twice Amended) A flame-sprayed aluminum-alloy, containing from 12 to 60% by weight of Si, the balance being essentially Al, the aluminum-alloy flame-sprayed by means of high velocity oxy-fuel flame-spraying method (HVOF) onto a substrate roughened by shot blasting, and includes granular Si particles dispersed in the matrix of the aluminum alloy, the granular Si particles having a short-diameter/long diameter ratio of 1/3 or more and some of the granular Si particles having ~~a~~ an average particle size greater than 10 μm , and further said flame-sprayed aluminum alloy has adhesive strength of film higher than that of a flame-sprayed Ni film, as measured by a shear-fracture testing method.

2. (Twice Amended) A flame-sprayed aluminum-alloy containing from 12 to 60% by weight of Si, from 0.1 to 30% by weight of Sn, the balance being essentially Al, the aluminum-alloy flame-sprayed by means of high velocity oxy-fuel flame-spraying method (HVOF) on a substrate roughened by shot blasting, and includes granular Si particles and Sn dispersed in the matrix of the aluminum alloy, the granular Si particles having a short-diameter/long diameter ratio of 1/3 or more and some of the granular Si particles having ~~a~~ an average particle size greater than 10 μm , and further said flame-sprayed aluminum alloy has adhesive strength of film higher than that of a flame-sprayed Ni film, as measured by a shear-fracture testing method.

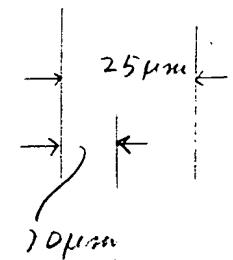
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Average Size

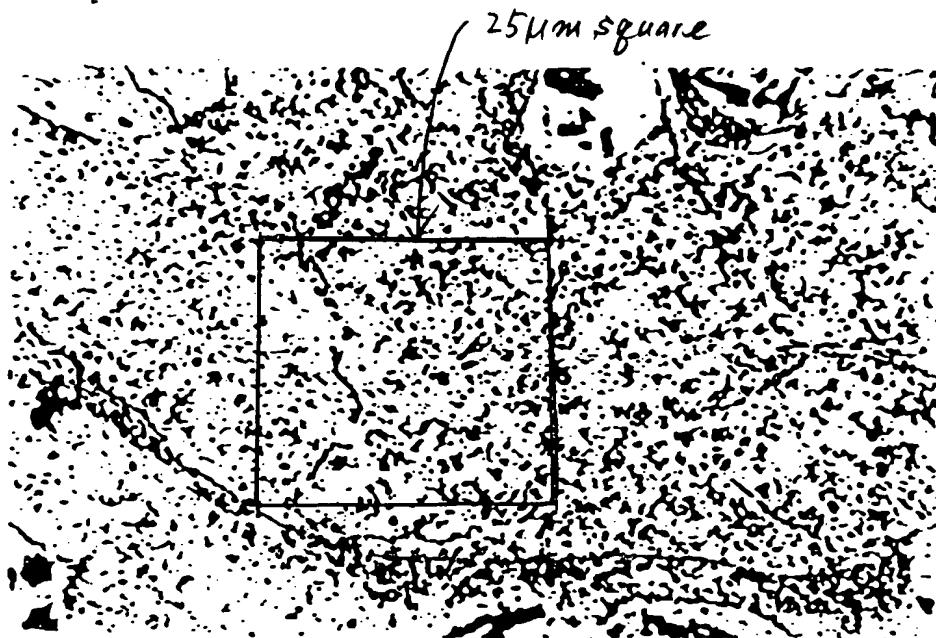
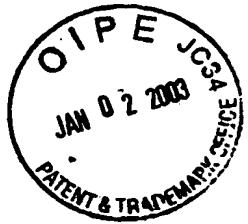


25 μm

Average-
Size
Particle



09/423, 981



Present Invention
RECEIVED Product $\text{10 } \mu\text{m}$
JAN 06 2003
TC 1700

Fig. 1

